



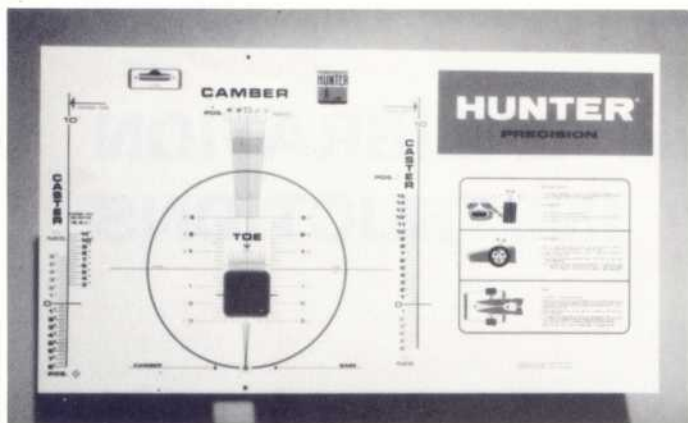
# **OPERATION and CALIBRATION INSTRUCTIONS**

**Hunter LITE-A-LINE II Wheel Aligners**

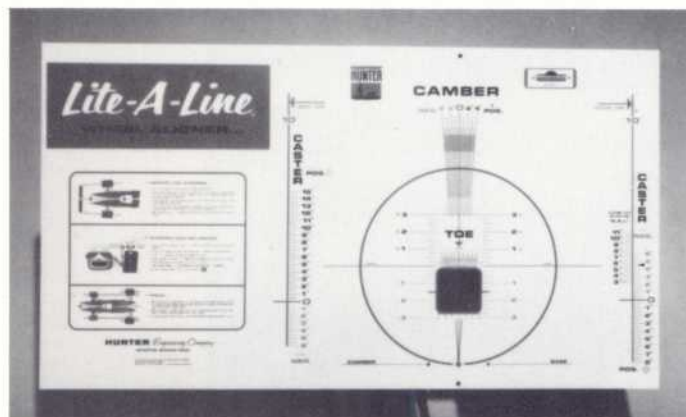
# Orientation & Familiarization



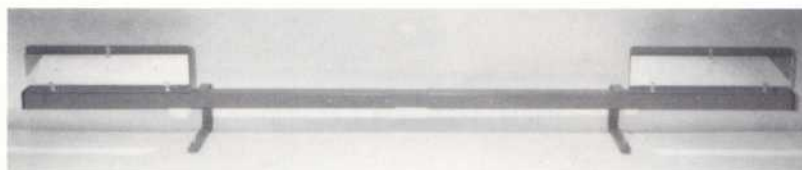
TYPICAL 4-DOOR CABINET & INSTRUMENTATION GROUP  
(Pass. Car)



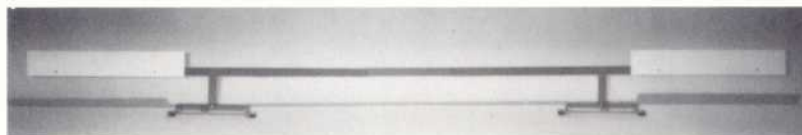
L.H. 10° CHART  
(Pass. Car)



R.H. 10° CHART  
(Pass. Car)



TOE MIRROR BAR



PEEP GAGE

TOP CAM LOCK CASTING

T-WRENCH

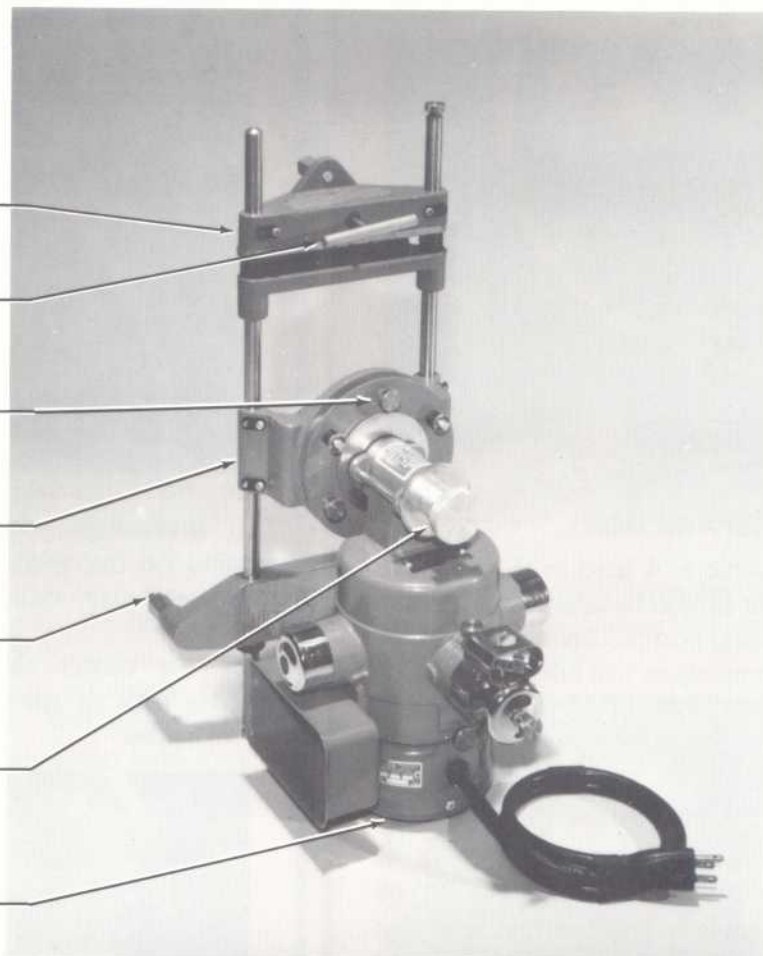
COMPENSATOR SCREW(s)

CENTER CASTING

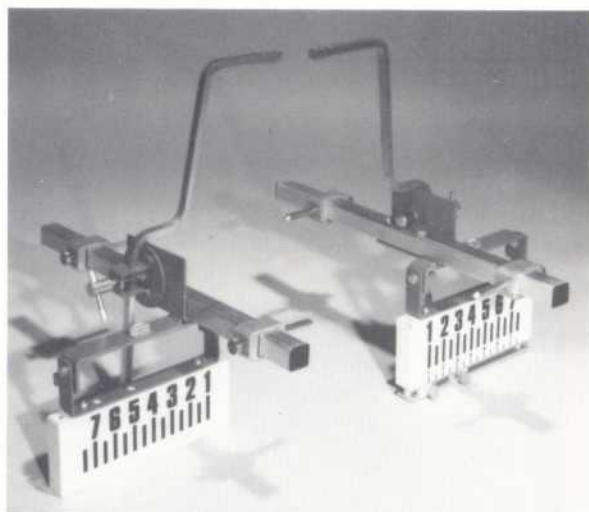
LOWER RIM SCREW(s)

PROJECTOR LOCK KNOB

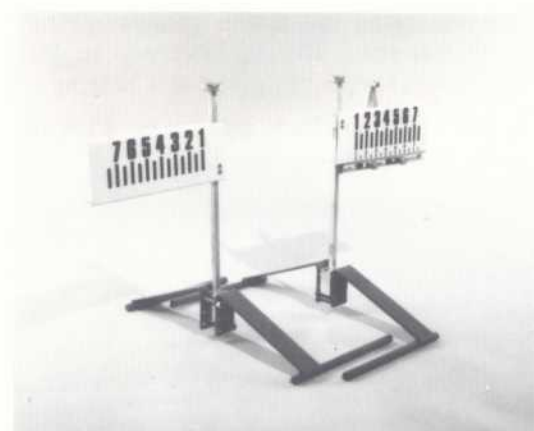
LAMP SUPPORT ASSEMBLY



LITE-A-LINE II PROJECTOR



CENTER-POINT GAGES (Pass. Car)  
(Optional)



CENTER-POINT GAGES (Trk.)  
(Optional)



## FOR YOUR SAFETY

Read and follow all caution and warning labels affixed to your equipment and tools.

## FOR YOUR PROTECTION

Upon delivery of your wheel aligner, fill out your guarantee cards and mail promptly. Your equipment was engineered and manufactured to give many years of dependable, trouble free service. If it is given just reasonable care and operated according to the instructions, it should make wheel aligning one of your most profitable services.

## PREPARATION

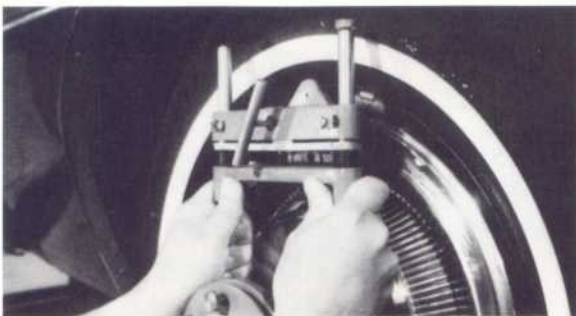
Check loading of vehicle. A load in the trunk or other part of the car should be approximately the same as present during normal driving conditions. Accurately check and adjust tire pressure. Inspect for uneven, worn tires (install best tires on front). Check for loose, worn, or bent wheel bearings, upper and lower ball joints, upper and lower control arm bushings, stabilizer bushings, strut rod and strut rod bushings, coil springs and coil spring height, torsion bars and torsion bar height, tie rod ends, tie rod sleeves, idler arm, pitman arm and drag link. A thorough inspection of all front end components is as important as the alignment measurements themselves.

## INSTALLING INSTRUMENTS

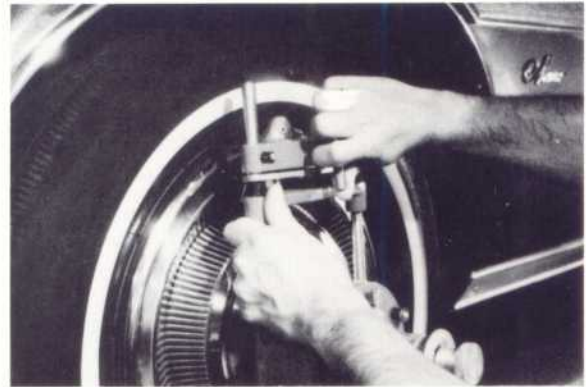
**CAUTION:** The Lite-A-Line II projectors are precision instruments. Handle with care to avoid damage and/or loss of calibration.

Position the two lower rim screws on the wheel rim.

Slide the top cam lock casting up to engage the top rim screw with the wheel rim.

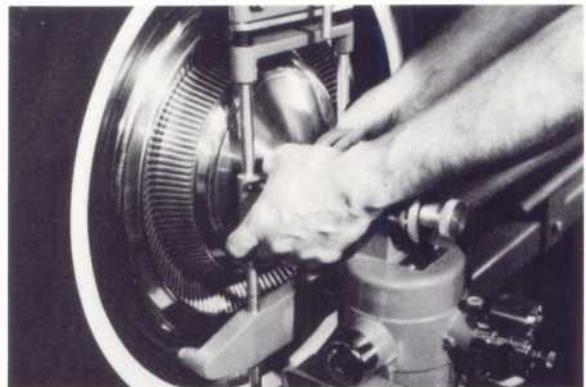


Check that all three rim screws are contacting the rim and set the cam lock in the locked position by turning the T-wrench.

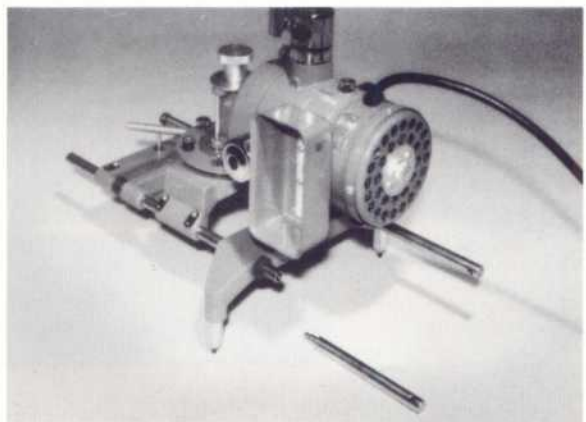


Test the security of the installation by lightly tugging on the two adaptor rods (holding them securely while so doing).

Slide the center casting up or down on the adaptor rods to approximately align it with the wheel center.



**NOTE:** For 10", 12" and some 13" wheels, remove the two rod extensions by loosening the lower casting screws (using the T-wrench) and unscrewing the rod extensions. Retighten the lower casting screws.



To install the projector adaptor on a wheel with no rim lip, follow these procedures:

- Remove the top casting from the adaptor rods.
- Invert the casting and slide it back onto the rods.
- Move the rim button to the other hole provided in the top casting.
- Install the adaptor on the wheel with the rim screws on the OUTSIDE of the rim.
- Set the cam lock in the locked position by turning the T-wrench (the locking action will now be from the outside of the rim inward).

### INSTALLING INSTRUMENTS ON LARGE TRUCK WHEELS

Lite-A-Line II truck projector assemblies are equipped with longer adaptor rod extensions, adaptor rod stiffener assemblies, a top twin lock casting and longer rim buttons.

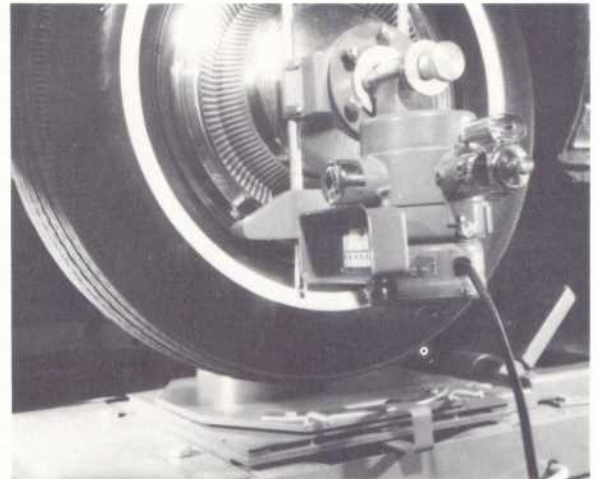


Installation of the truck projector assemblies is the same as passenger car assemblies except there will be four rim screws contacting the rim and it is not necessary to invert the top casting when installing instruments on the outside of the rim.

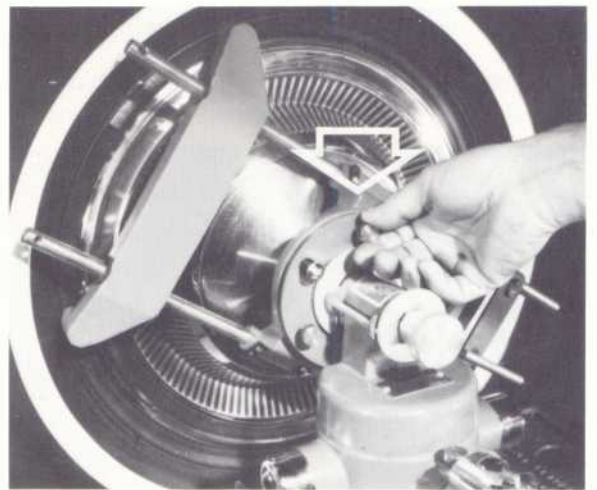
### COMPENSATING INSTRUMENTS

Apply the emergency brake and chock the rear wheels.

Jack up front wheels to clear the turning angle gages.



Adjust the three compensator screws so that the ball ends of the screws are visible between the plate and the casting.



Loosen the center lock knob.

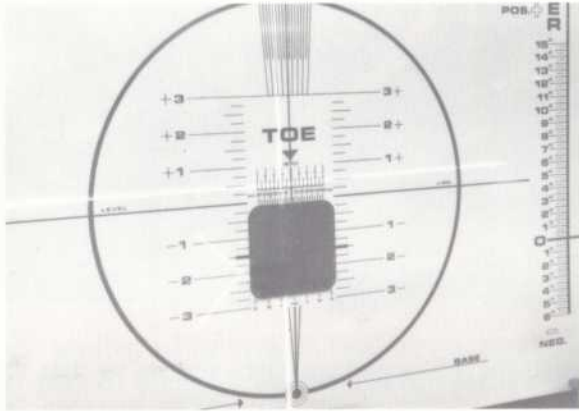
Turn on the projector lamp and adjust (by turning, raising or lowering, or tilting the positioning knob) to obtain the brightest light beam on the chart.





Slowly rotate the wheel clockwise by hand and observe the sideways oscillation of the vertical light beam on the chart.

Position the chart so the vertical red "toe" line is midway between the light beam oscillation extremes.



Stop the wheel at one extreme of oscillation.

Adjust the compensator screw at the 9 o'clock or 3 o'clock position to bring the light beam to the red "Toe" line. (NOTE: It may be necessary to rotate the wheel slightly to bring the compensator screws to the 9 o'clock or 3 o'clock position.)



Again, rotate the wheel clockwise until the light beam is at the other extreme of oscillation.

Adjust the compensator screws as before. (Always use the compensator screw at the 9 or 3 o'clock position.)

Continue to compensate until oscillation is reduced to less than 1/16 inch.

Repeat this procedure on opposite wheel.

Center the turning angle gages under the front wheels, remove the lock-pins, lower the vehicle and jounce.

## TAKING ALIGNMENT READINGS

### PREPARATION (SETTING WHEELS STRAIGHT AHEAD)

Place a brake-pedal depressor, scale or stick against the right side of the vehicle frame approximately 70" back from the front wheel center.

Mark the point where the vertical light beam crosses the brake pedal depressor.



Repeat on the left side of the vehicle.

Place a mark midway between the two marks.

Adjust the steering wheel until the vertical light beam is on the middle mark. The wheels are now positioned straight ahead.



## SETTING WHEELS STRAIGHT AHEAD USING OPTIONAL CENTER-POINT GAGES.

Installing center-point gages

- Unfold center-point gages.
- Swing hook 90° from cross bar.
- Adjust rim pins on cross bar so they rest firmly on the wheel rim at approximately the horizontal center-line.
- Adjust the hook height so when placed on tire, the gage level is level.

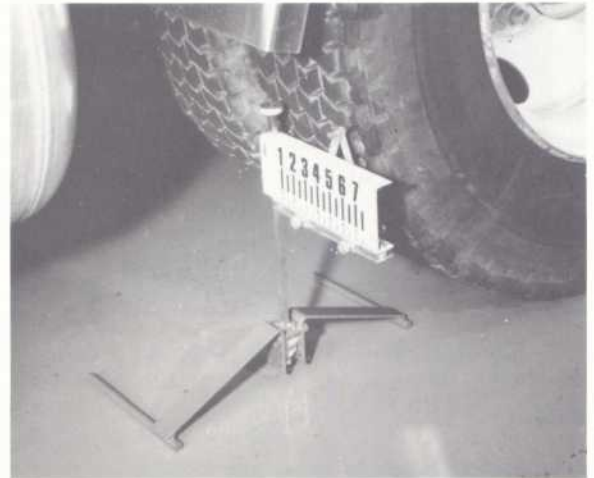


NOTE: If the rear fender skirts are close to the tire, use the short rim pin assemblies to install the gages. If the tires bulge considerably, use the longer rim pin assemblies. On vehicles where the rear fender skirts hang low over the wheels, use the longer hooks to clear the fender skirts.

Install truck center-point gages as shown.



NOTE: Center-point gage readings may be off scale on some tractors with dual rear wheels. In this case, position the center-point gages in front of the outer wheel as shown. Be sure both gages are equally positioned.

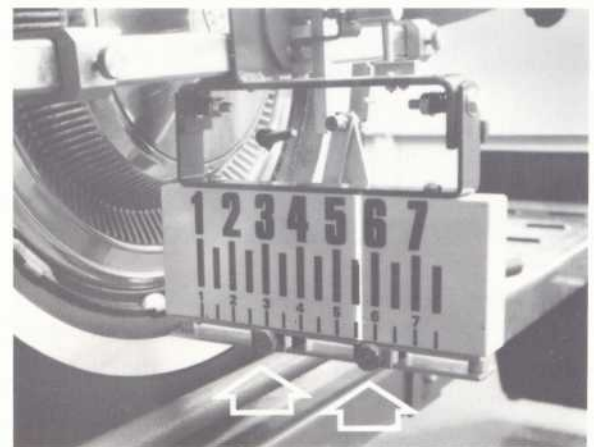


## USING CENTER-POINT GAGES

Observe the reading on each center-point gage at the center of the light beam.

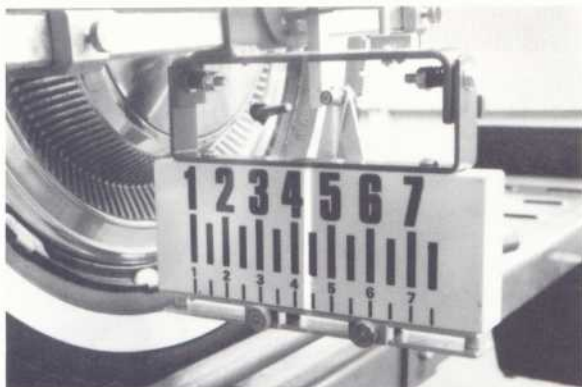


Place the indicators at the bottom of the left gage on the two readings obtained





Using the steering wheel, turn the wheels until the vertical light beam intersects the target on the top of the left gage.

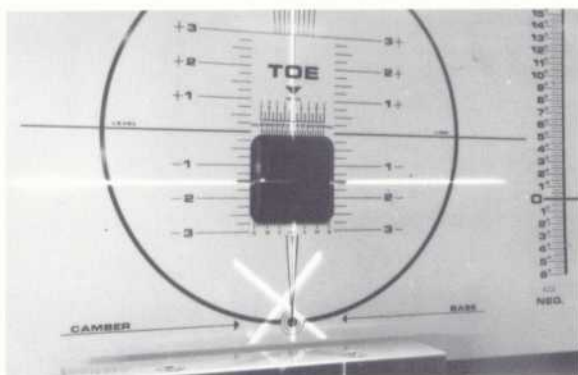


The front wheels are now positioned straight-ahead.

### TAKING TOE READINGS

In anticipation of future adoption of the metric system by the United States of America, some charts and projector toe scales are being calibrated in millimeters (MM) and minutes (1/60 of a degree) in addition to the present inches standard. The calibration in MM is based on a tire diameter of 711 MM. The minutes calibration is actual toe angle and is not related to tire diameter. However, 30 minutes (1/2 Degree) is approximately 1/4 inch or 6.2 MM Toe.

Loosen the center lock-knob and tilt the left projector to position the horizontal light beam on the red marks on both sides of the toe mirror window. Retighten the lock-knob.



Using the toe mirror bar elevation knob (protruding thru the bottom shelf in front of the charts), slide the left hand leg of the toe mirror bar so that the vertical light beam is centered on the zero toe line in the projector toe box.



Slowly turn the elevation knob to center the horizontal light beam on the horizontal black line on the toe box scale.

Loosen the center lock-knob and tilt the right projector until the horizontal light beam is centered on the red marks on both sides of the toe mirror window. Retighten the lock knob.

Slowly turn the right elevation knob to center the horizontal light beam on the horizontal black line on the right toe box scale.

Recheck light beams in left toe box and adjust to zero if required.

Read total toe on the scale in the right toe box.



NOTE: If wheels have more than 3/8" toe, relocate vertical light line in left toe box to any reading and add that amount to reading in right toe box.

### EXAMPLE:

Left toe box relocated to show 3/8" in.  
Right toe box shows 1/4" in.  
Total is 5/8" in.



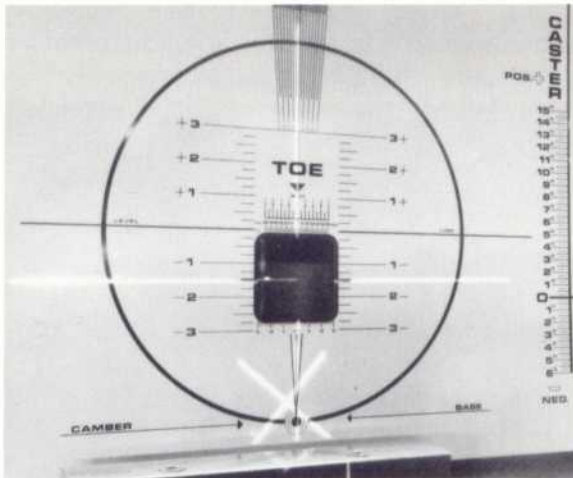
**CAUTION:** Excessive toe-in or toe-out can cause significant errors in camber, caster and S.A.I. readings. If total toe exceeds  $3/8"$ , it will be necessary to set the wheel to be checked or corrected to its exact straight ahead position. To do this:

- Be sure the wheels are in the normal straight ahead position as previously described.
- Adjust the charts so that the vertical light beams fall on  $1/2$  of the obtained total toe reading. (Scales are above and below the toe bar window.)
- Turn the steering wheel until the light beam from the wheel to be checked is on the red zero toe line.
- The wheel is now exactly straight ahead and camber and caster readings can be obtained.

If total toe exceeds  $3/4"$ , toe must be adjusted to zero before proceeding.

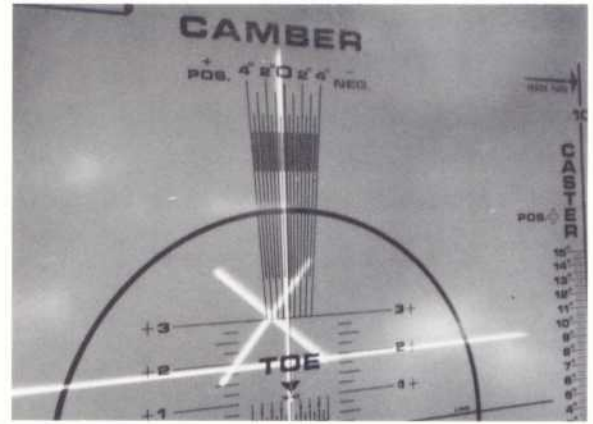
### TAKING CAMBER READINGS

With wheels in the straight ahead position, slide the left front chart so that the bottom end of the vertical light beam centers in the red dot at the camber base.



Loosen the lock-knob and tilt the projector, if necessary, to bring the upper portion of the light beam onto the camber scale. Retighten lock-knob.

Read camber on camber scale at top of chart (read at center of light beam).



Follow same procedure for right wheel.

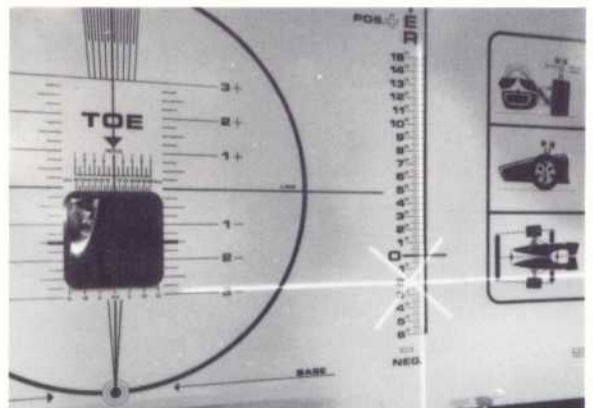
### TAKING CASTER READINGS

Loosen the projector lock-knob and allow the projector to swing free.



Set the wheels in the straight ahead position and center the charts on the light beams.

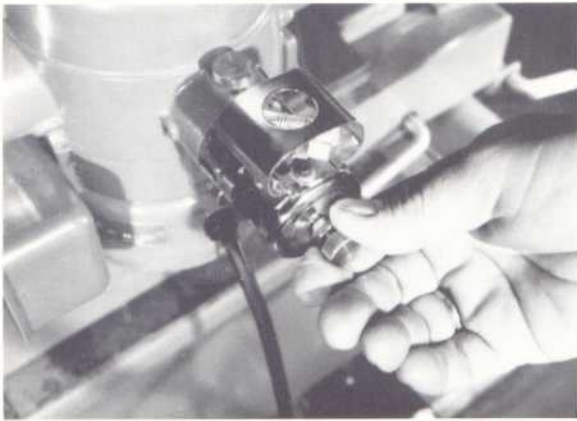
Turn the wheel to position the vertical light beam on the  $10^\circ$  turn line.



Tilt the projector to position the horizontal light beam on zero ( $\pm 1/2^\circ$ ).

Tighten the projector lock-knob.

Using the caster leveling screw, carefully center the caster level bubble.



Adjust the center of the caster "X" light beam to zero using the vertical positioning screw. (Be sure level remains centered.)

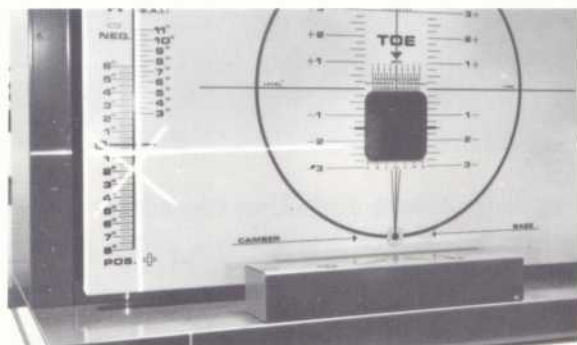


Loosen the projector lock-knob and turn the wheel to position the vertical light beam on the opposite 10° turn line.

Tilt the projector to position the horizontal light beam on zero ( $\pm 1/2^\circ$ ).

Tighten the lock-knob.

Re-center the caster level and read caster at the center of the "X".



Repeat procedure for the opposite wheel.

NOTE: For positive caster over  $10^\circ$ , always make the first turn to the OUTSIDE  $10^\circ$  turn line.

### CASTER USING TRUCK CHARTS

For wheels less than 19" in diameter, set both sliding scales on the charts to **1**.

For wheels 19" and larger, set both sliding scales on the charts to **2**.

Follow same procedure to obtain caster measurements.

### S.A.I. (Steering axis inclination) and INCLUDED ANGLE

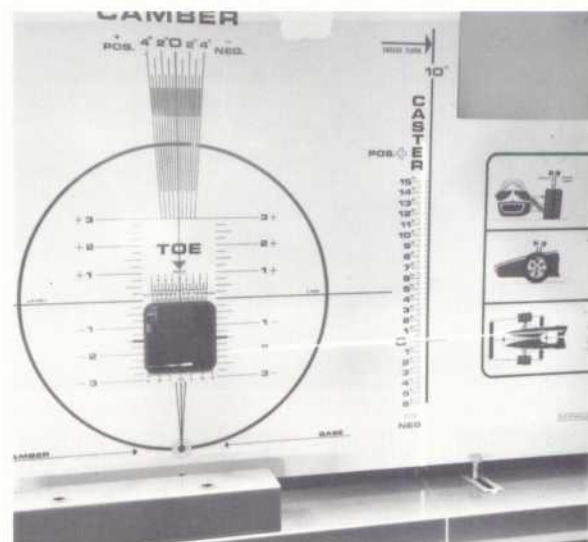
Using a brake pedal depressor, securely lock the front brakes.

Jack up the front wheels to clear the turning angle gage and take up any brake slack.

With the wheels in the straight ahead position, take the camber readings on both wheels.

Loosen the lock-knob and position the verticle light beam on the  $10^\circ$  inside the turn line.

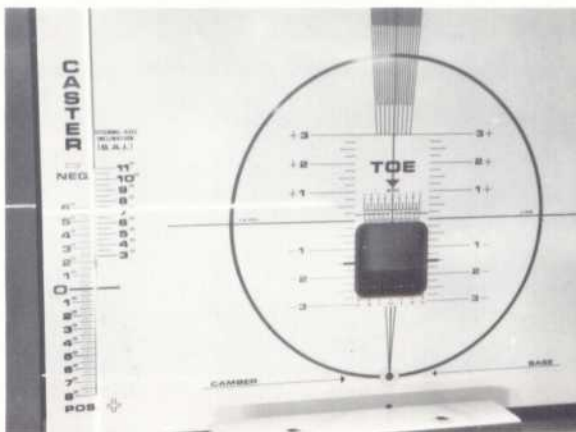
Tilt the projector to position the horizontal light beam on zero. Retighten the lock-knob.



Steer the wheel to position the vertical light beam on the  $10^\circ$  outside turn line.



Read S.A.I. where the horizontal light beam intersects the S.A.I. scale.



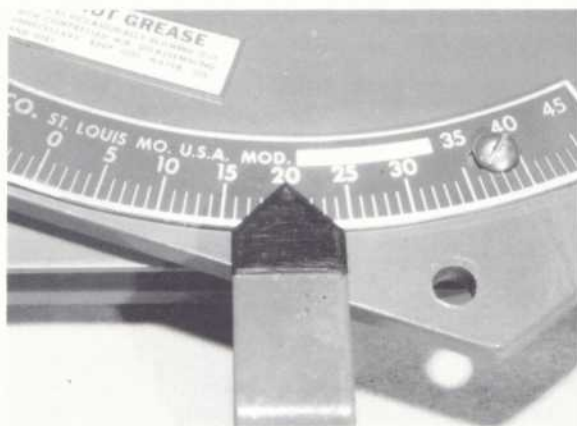
To obtain the INCLUDED ANGLE add positive camber angle to, or subtract negative camber angle from, the S.A.I. angle.

NOTE: Do not jar projector or wheel during S.A.I. measurement. Check by returning "X" light beam to original 10° turn to see if it still remains on zero.

S.A.I. is not fixed angle. It changes as camber changes. The angle between the wheel spindle and the steering axis is fixed. The INCLUDED ANGLE is a measure of this relationship. If the INCLUDED ANGLES are not within 1 1/2° side to side, check for a bent spindle.

### TURNING ANGLE

With wheels in the straight ahead position resting on turning angle gages (lock pins removed), swing one wheel out 20°.



Read the turning angle of the opposite wheel on its turning angle scale. (The angle will be less than 20°. See specifications manual, Form 172T.)

NOTE: Some specs require turning the wheel 20° IN, and in this case, the turning-angle specs are for the wheel on the outside of the curve and will be greater than 20°.

### MAKING ALIGNMENT CORRECTIONS

For best results, make corrections in the following order: CASTER, CAMBER, TOE.

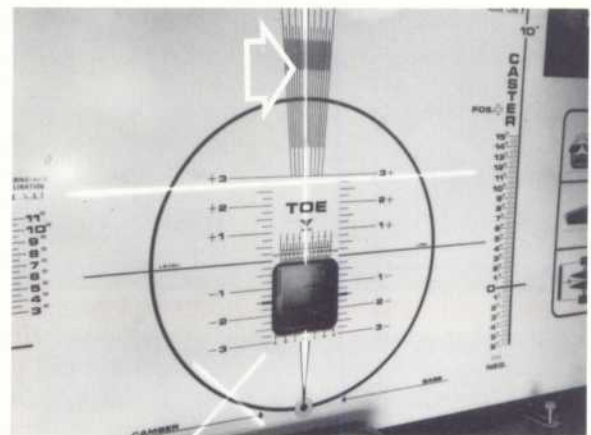
#### CASTER

Apply parking brake and chock rear wheels.

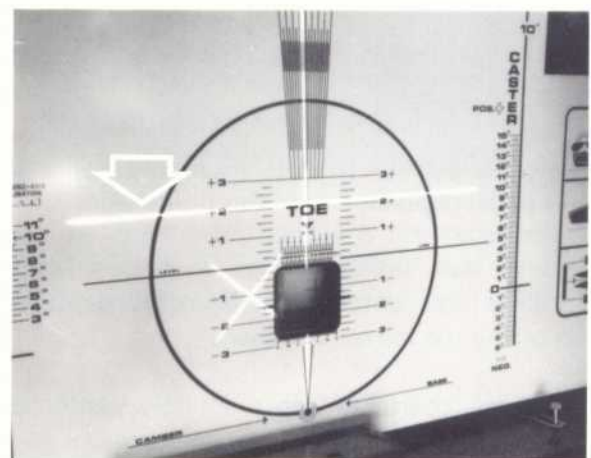
Jack up the front wheels from the straight ahead position.

Lock the brakes using a brake pedal depressor, and take up any brake slack.

Adjust the charts to place the vertical light beams approximately on the zero camber line.



Tilt the projector until the horizontal light beam falls on the caster correction scale at the previously obtained caster reading. Retighten the lock-knob.



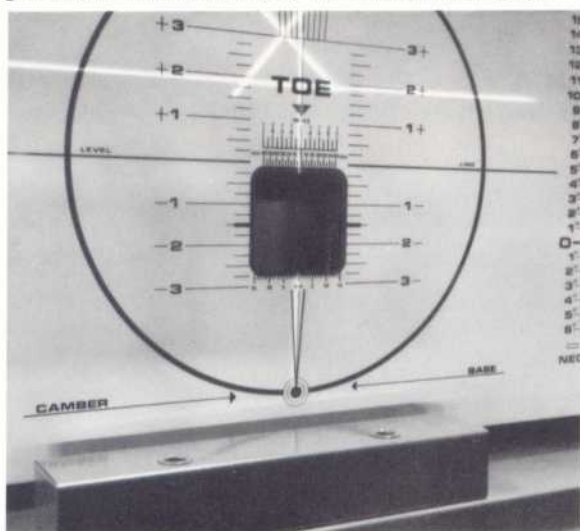
Adjust caster to the required setting observing the horizontal light beam on the caster correction scale. NOTE: If the vehicle caster exceeds  $3^{\circ}$ , place the horizontal light beam on zero (caster correction scale) and adjust caster the amount of correction only.

## CAMBER

Apply parking brake and chock the rear wheels.

Set the wheels to the straight ahead position.

Move charts to center the bottom of the vertical light beam in the red dot at the camber base.



Make camber adjustments while observing vertical light beam changes on the charts. (Keeping the vertical light beam in the red dot at the camber base.)

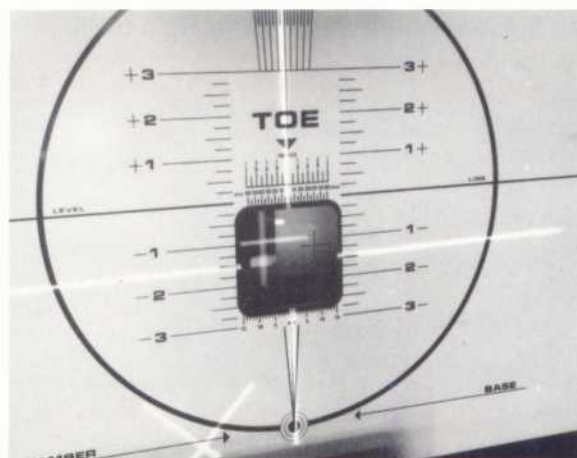
If camber adjustments are made with the wheels jacked-up, determine the amount of change required and adjust so as to add or subtract this amount from the camber readings obtained when the vehicle is jacked-up.

## TOE & CENTER-POINT STEERING

Set wheels to the straight ahead position using brake-pedal depressor or center-point gages.

Tilt and lock the projectors so the horizontal light lines are centered on the red lines on the sides of the toe mirror windows.

Adjust the charts to approximately center the vertical light beam on the chart toe zero line.



Obtain the toe reading from the projector toe boxes, compare with the desired setting and determine the required correction.

EXAMPLE: Toe reading is  $3/8''$  OUT  
Desired setting is  $1/8''$  IN  
Correction is  $1/2''$  IN



Move the charts so that the vertical light beams are set at  $1/2$  the correction required (Example:  $1/4''$  OUT).



Loosen the tie-rod sleeves so they turn freely.



Center the steering wheel and lock with a steering wheel holder. (Start engine if vehicle is equipped with power steering.)

NOTE: To check center of steering gear on worm, turn the steering wheel to one limit, then count the turns and fractions of a turn to the opposite limit. Turn the wheel back halfway and check the alignment of the steering wheel and pitman arm. When these parts are in line, center steering can be obtained provided parts have not been bent.

Adjust the tie-rod sleeves to bring the vertical light beams on the charts to zero toe.

Re-check toe readings in the projector toe box.



### TAKING ALIGNMENT READINGS ON REAR WHEELS

Back vehicle into position in front of charts and chock the front wheels.

Rear wheel camber and toe are determined the same as for front wheels. (Be sure to compensate both instruments.)

Since toe is measured from the rear of the wheels instead of the front, toe readings are reversed. For example, a 3/16" toe-out reading means the wheels are actually toed-in 3/16".

Axles of trucks, tractors, semi's and trailers can be aligned with the Lite-A-Line II using either brake pedal depressor or center point gages for track measurements.

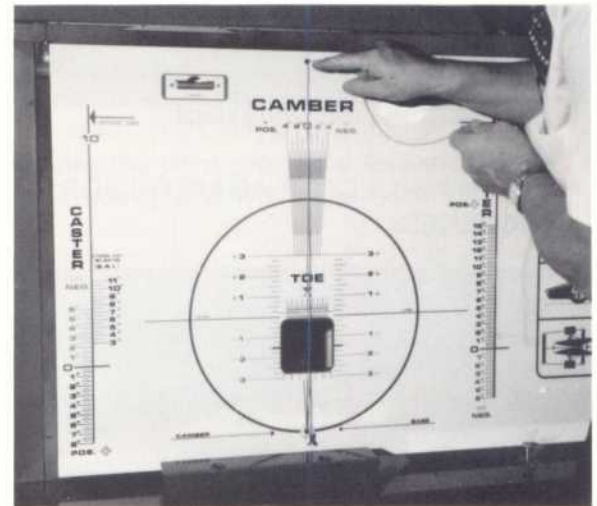
### CHECKING TRACK

Rear wheel track should be within 1/2" side-to-side when using the chalk marks on the brake pedal depressor at 70", or within one number difference when using the center-point gages.

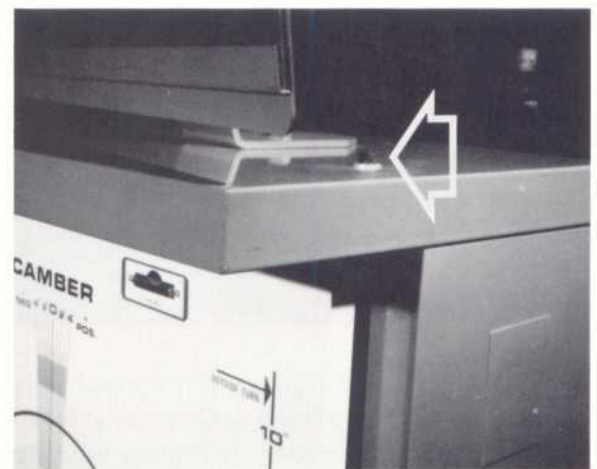
### CHECKING INSTRUMENTS

#### CHECK THE CHART LEVELS

Check the plumbness of the chart using a small plumb bob or a bolt tied to a string.



Adjust the chart leveling screw to bring the zero camber line to the exact vertical.



If the chart level bubble is not centered, loosen the mounting screws, center the bubble and retighten the screws.

## CHECK THE CHARTS

Slide the charts to both ends of travel to be sure rollers are free and move easily.

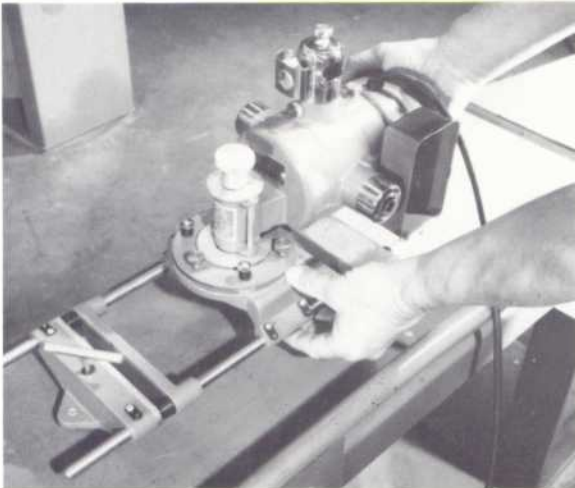
Center the charts.

## PROJECTORS

The Hunter Lite-A-Line II is a light beam type projector that may be checked for accuracy "in the field" by the operator. In the event of slight damage, they may be very simply readjusted to bring all readings back to the original factory settings. This procedure is relatively simple and easily performed, but very close attention should be paid to all of the following steps:

### CHECK PROJECTOR ADAPTOR FOR LOOSENESS

With the projector lying in a horizontal position on the three rim screws, check for looseness between the center casting and the adaptor rods. (Check by feeling with the fingers while attempting to move the projector head up and down slightly.)



To remove any play, snug up on the two phillip screws on each side of the center casting. NOTE: snugging-up on the screws too tightly will interfere with the sliding of the center casting on the adaptor rods.

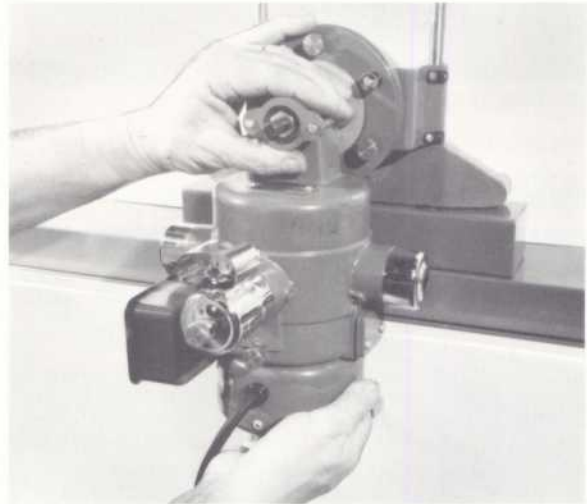
### CHECK COMPENSATOR ASSEMBLY

Check the three springs for weakness or breakage.

Position the compensator screws so that only the ball ends are visible. Check the assembly for looseness or weakness. (Be sure both nuts on the back of the bearing shaft are tight.)

Move center casting to contact bottom casting.

Check bearings for end and radial play by gently moving projector head up and down while feeling for looseness. No play should be felt.



### CHECKING CAMBER AND TOE LIGHT BEAM ACCURACY

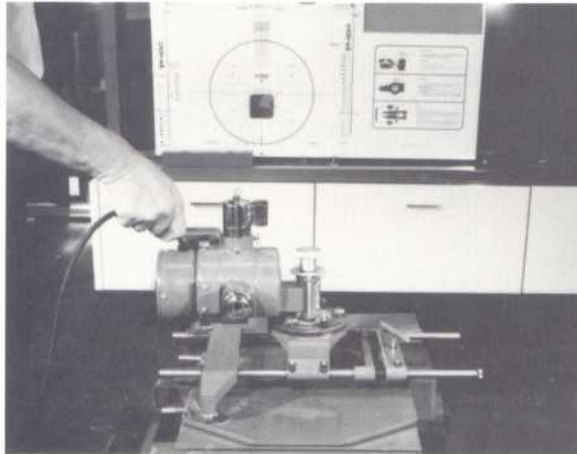
Position the projector on the rack with the rods parallel to and approximately 6 feet from the charts.

Point one of the camber/toe beams at the chart and mark the exact center of the light beams. (NOTE: when observing the front camber/toe light beams on the chart, the center portion, about 5", of the cross appears slightly out of focus. This is normal, due to the dual focus optics of the lens system.)

Loosen the projector lock knob so the projector swings freely.

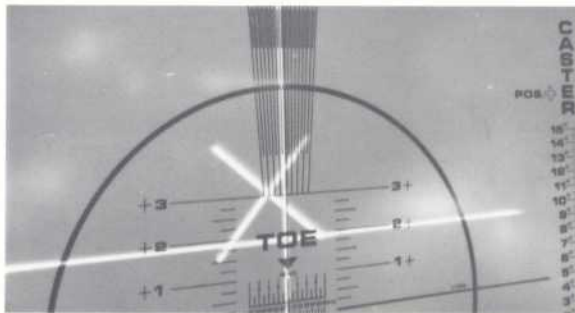


While holding the lamp cord, slowly rotate the projector head. The centers of both light beams should intersect the mark within one width of the beam. (NOTE: If the centers of both light beams do not intersect the mark within one beam width, contact a factory Service Representative to determine the problem.)



### CHECKING CASTER "X"

Using the same setup as for camber/toe, swing the projector head so that the caster "X" beam appears on the chart.



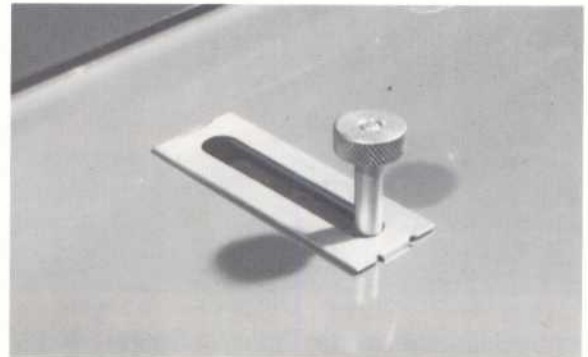
The center of the "X" beam should be approximately 5/8" above the horizontal light beam. (To adjust, loosen the mirror adjustment screw and turn the mirror assembly to bring the "X" beam to 5/8" from the horizontal light beam.) Retighten mirror adjusting screw.



### CHECK TOE MIRROR BAR

Remove both charts.

Slide both toe mirror bar elevation knobs to the front of the slots.



Remove the peep gage, fold feet and place directly in front of, and 1/8" away from, the toe mirror bar.



Sight down between the left end peep gage and the toe mirror.

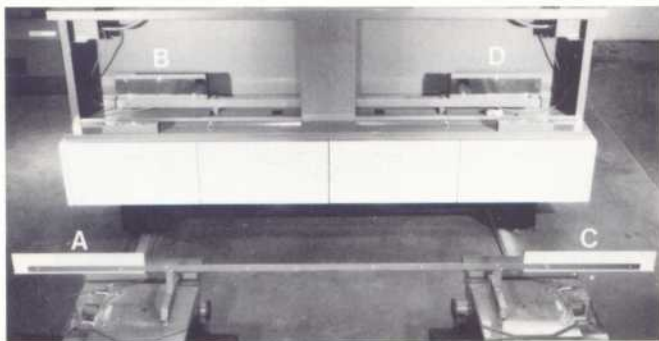
Move the peep gage right or left to line up the vertical lines of the center crosses of the mirror and peep gage.

Sight between the right end peep gage and toe mirror. If the vertical lines of the center crosses do not line up, loosen the RIGHT mirror retainer clips and slide the mirror until the crosses are perfectly aligned. Tighten the mirror retainer clips (do not over-tighten).

Recheck both ends to be sure the crosses are perfectly aligned.

Remove the peep gage from in front of the mirrors, unfold the feet and rotate them to 90° from the peep gage.

Place the peep gage on the turning angle gages, parallel to and 70" from, the toe mirrors. (NOTE: the center of the turning angle gages are approximately 70" from the toe mirrors.)



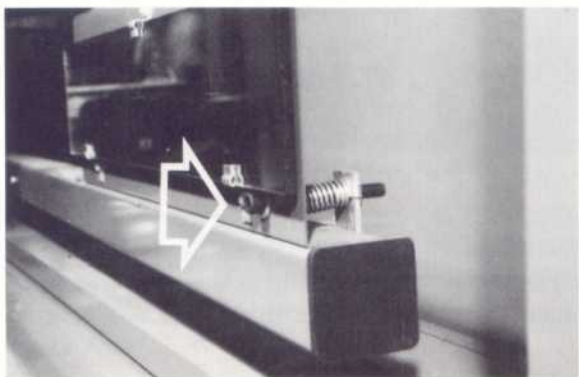
Sight through the center hole at the left end of the peep gage (point A).

If the horizontal lines of the peep gage (point A) and toe mirror crosses (point B) do not line up, adjust the left elevation knob until the horizontal lines are approximately aligned. (Within 1/16" of one another.)

Repeat procedure at the right end of the peep gage (point C) and toe mirror (point D).

Sighting through the center hole in the left end of peep gage (point A), slowly slide the peep gage sideways until the vertical lines of the center crosses (points A and B) line up perfectly.

Sight through the center hole of the right end of peep gage (point C) and using the toe mirror adjusting screw, perfectly align the vertical lines of the center crosses (points C and D).



Check the inner and outer peep gage crosses on both ends to be sure all vertical lines are aligned. If all lines are not within 1/64" of being aligned, contact the Hunter Service Representative to determine the cause.

## CARE OF YOUR LITE-A-LINE EQUIPMENT

This equipment is scientifically engineered and has been precision manufactured to provide many years of profitable, trouble-free service. Reasonable care should be exercised in handling the projectors to avoid bumping, jarring or dropping them. Keep them clean and replace them in hangers when not in use.

A periodic check of all parts of the operating system in accordance with previously described procedures will assure keeping the equipment in top condition.

### PROJECTORS

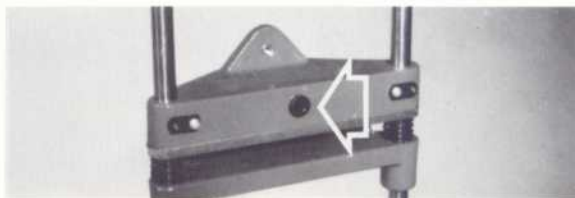
Dimming of light lines. At first indication of light line dimming, clean all exposed portions of the three lens barrel assemblies (remove lamp support for access to inside surfaces) and the **caster** mirrors of each projector. Use a soft clean cloth—such as a cotton diaper—and alcohol. Polish with same type cloth.



Clean lamp similarly. Do not touch lamp with bare hands. When replacing a lamp use wrapper provided or a soft cloth.

Always check projectors immediately if dropped or severely bumped or jolted. If light beams do not intersect properly, contact a factory Service Representative to determine the problem.

An occasional drop of oil on the lock pin bearings will keep the pin free.





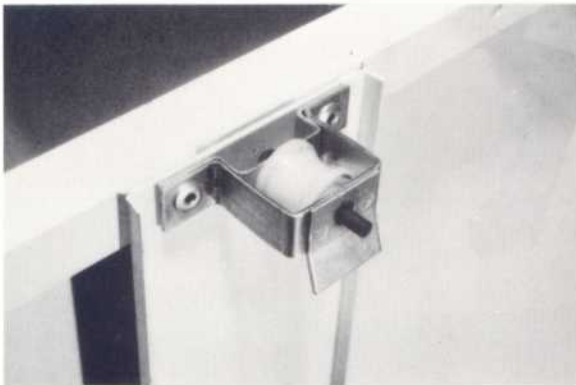
## CHARTS

Clean periodically with detergent and water to keep lines bright and sharp and to keep background as reflective as possible. (NOTE: do not wax charts.)



Check charts for levelness frequently, and especially after having been severely bumped or jolted.

Clean roller and track with detergent.



## TOE MIRRORS AND BAR

Perfect alignment of the toe mirror bar is essential in order to obtain precise toe readings.

Clean both mirrors at the same time and in the same manner as the projector lenses. Be careful to avoid moving the mirrors while cleaning. It is recommended that alignment be checked with the peep gage following cleaning.

## PEEP GAGE

Check the toe mirror bar periodically with the peep gage as described earlier. It should be checked immediately after any severe bump or jolt.

## TURNING ANGLE GAGES

The turning angle gages are equipped with dirt and water seals and, consequently, require little maintenance. Exterior surfaces may be cleaned with a light engine oil or kerosene and wiped dry with a clean soft cloth. Do not disassemble. Rub paraffin on pointer and slide mechanism on bottom of turning angle gage. Do not hose down.

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